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MEDICINE

Chain Reaction Celebrated

First nuclear chain reaction was achieved Dec. 2, 1942, which has led to better treatment for cancer, leukemia, thyroid disorders, and other diseases.

➤ NEW REPORTS of the benefits and dangers from atomic energy highlighted the fourth anniversary of the first self-maintaining nuclear chain reaction at the University of Chicago's metallurgical laboratory.

Sufferers from leukemia, cancer, thyroid gland disorder and perhaps other diseases have reason to join with scientists in remembering December 2, 1942. Peaceful applications of atomic power are becoming available for medical use.

Treatment of five times as many leukemia sufferers as formerly at one medical institution is one of the most recently announced achievements from a chain reacting pile. The reduced price of radioactive gold from the uranium pile at Oak Ridge, Tenn., makes it possible for more leukemia sufferers to get radiation treatment. This was announced by the Monsanto Chemical Company which operates the Clinton Laboratories at Oak Ridge for the Manhattan Engineer District.

Future accomplishments in treatment of disease and in better knowledge of body chemistry in health and disease will be greater than what has already been achieved with radioactive isotopes, scientists predicted at the anniversary observance held in connection with the meeting of the Radiological Society of America in Chicago.

New knowledge of the dangers of radiation has been gained through medical studies during and since the development of the atomic bombs.

Most of the hazards of over-exposure to radiation in the industry itself have been eliminated, Dr. C. Ladd Prosser, of the University of Illinois, stated. His experiments showed that the effects of radiation on the body are not progressive but happen very suddenly some weeks and even months after exposure.

Healthy cells surrounding cancer cells may become cancerous after the original malignant cells have been treated by radiation, Dr. Austin M. Brues, director of the biology division of the Argonne National Laboratory, has found in his work on the Plutonium Project.

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ASTRONOMY

Sun's Speed Related To Globular Clusters

➤ A NEW star-gazing study has uprooted the basis for determining the speed at which the sun travels in its orbit through the Milky Way.

But it's nothing to worry about. The sun is still highballing at the same speed. The early estimates were "lucky" in accurately calling the turn.

This is revealed by Dr. Nicholas U. Mayall, associate astronomer in the University of California's Lick Observatory.

The new facts were unearthed in observations of 50 globular star clusters, great spherical stellar concentrations which pepper the heavens out to the edge of the galaxy.

Dr. Mayall explained that the sun's speed was estimated by observing its position relative to a few of the globular clusters. It was assumed in these calculations that the clusters did not rotate.

These "island universes" do rotate slightly. Dr. Mayall found the calculation comes out the same: the sun is traveling in its orbit at from 175 to 185 miles per second.

In addition to their rotation, Dr. Mayall discovered that the star clusters are traveling at a great random speed through space unlike the majority of stars in the galaxy. This random velocity is about 60 miles per second, which compares with a random speed for the sun and other stars in the galactic system of about 10 miles per second.

The globular clusters form the backbone of the galaxy, of which the solar system is but a trivial part. They contain stars of all brightnesses. The sun would be lost in one of them, since most of them contain tens of thousands of stars as bright or brighter.

About 100 such island universes are known, the closest being about 25,000 light years away and the farthest 150,000 light years distant. A light year is nearly six million miles.

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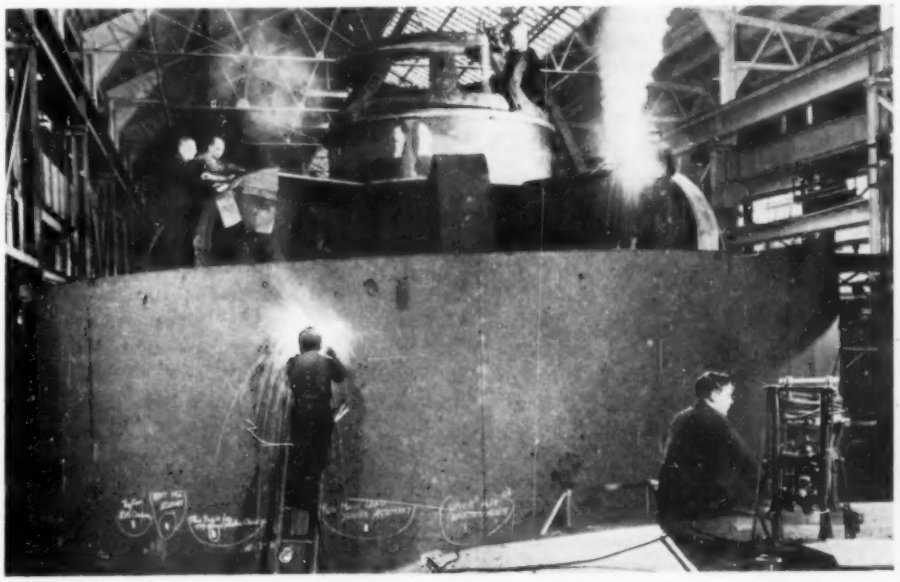
MEDICINE

Toxic Convulsions Caused By Lack of B Vitamin

➤ THE DANGEROUS toxic convulsions which afflict some expectant mothers shortly before their babies are due may be caused by lack of a B vitamin, choline.

The counterpart of the damage to kid-



TO GIVE POWER—The last of five generators for Shasta Dam, second largest structure built by man and in the Sacramento River Valley, is being constructed by General Electric.

neys and liver seen in these women can be produced in rats on a diet lacking in choline, Dr. Paul Gyorgy, of the University of Pennsylvania Medical School, reported at a conference held by the New York Academy of Sciences.

Eating a high protein diet would be better for the expectant mothers than taking doses of choline to prevent the condition, Dr. Gyorgy believes. In the rats a deficiency in the ratio of choline to cystine, one of the amino acids from proteins was as important, if not more so, than lack of choline in producing the kidney and liver changes.

Massive hemorrhage in the adrenal glands and a bone marrow degeneration which results in anemia occurs when rats, and maybe humans also, do not get enough of another B vitamin, pantothenic acid, Dr. Gyorgy reported.

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GENERAL SCIENCE

Nazi Mass Sterilization

➤ ADD TO THE HORRORS of war the possibility of making all the people of a nation barren without their knowing they had been sterilized. This possibility was explored by Nazi physicians, Dr. A. C. Ivy, vice-president of the University of Illinois, reports. Dr. Ivy has returned from a government mission on which he was the American Medical Association representative to investigate war crimes of a medical nature.

Putting the dried juice of a plant in the food of a population and exposing men and women to a castrating dose of X-rays while they filled out government forms were two methods of secret mass sterilization studied by Nazi physicians.

One series of murders was done to provide skeletons for an anthropological museum.

Operations were done on human beings as part of the procedure in training students in surgery.

Besides the mass sterilization studies, Dr. Ivy lists 15 other experiments in his report to the Secretary of War.

Twenty-three Nazi physicians will be tried in Nuernberg, starting Dec. 5, on charges of having conducted experiments on human beings resulting in innumerable deaths. The American Medical Association, through an editorial in its Journal, gave as its verdict that such experiments certainly are "contrary to the laws of humanity and the ethical practices of the medical profession which have prevailed for more than 20 centuries.

"Not the slightest good to mankind has resulted from these experiments. The basic sciences and medicine languished in Germany during the period of the war more than in any other country.

"Perhaps most serious of all is the failure of German medical organizations and societies to express in any manner their disapproval of these widely known experiments."

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NUTRITION

Bodies Need Fat, Protein

➤ CONSUMER demand for meat or other protein and fats for food is tied up with the economics of the human body as well as with the economics of the market place, it appears from a report by Dr. E. B. Forbes, emeritus professor of animal nutrition, Pennsylvania State College, at the 100th birthday celebration of the University of Buffalo School of Medicine.

Fat and protein, he reported, favor the transformation of food into body substance with less energy waste than would be supposed from the effects of individual foodstuffs. It is not surprising that fat and protein are thus economically transformed into body substance, he pointed out, since human and other animal bodies are made up mainly of fat and protein.

"A lot of people have very wrong ideas" of the effects of foods in nourishing the body, Dr. Forbes declared. The reason for these wrong ideas is that they are based on study of the effects of one class of foods fed by themselves.

The once-popular notion that meat or other proteins should not be eaten in hot weather because of their heating effects is an example of some of these wrong ideas.

Meat or other protein food which has the highest heating effect when fed by itself has the exactly opposite effect when fed in a mixed diet such as people usually eat, Dr. Forbes found from his 24-year study of animal nutrition.

The same is true of fats, he found. Diets containing varying amounts of fat but supplying the same amounts of protein and energy were fed in some of his studies. The efficiency with which the energy of the complete diet was used increased as the amount of fat was increased.

The importance of all the nourishing substances in diet was stressed by Dr. Forbes.

"No one essential is more essential than another," he declared.

The maximum usefulness of each food substance and of the entire diet depends on all the body's needs for nutriment being satisfied.

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OPTICS

Mirror Can Be Window Too

➤ PEEKHOLES in apartment doors are no longer necessary. A window pane that is a mirror from the outside can be used instead. To the person on the inside it is clear glass.

This transparent mirror is now in production and available for civilian uses. It was developed early in the war and served many war purposes, particularly to meet aircraft demands for high-quality instruments. It was developed in the mirror division of Libbey-Owens-Ford Glass Company.

The treated glass functions as a reflecting surface when seen from one side, and simultaneously as a window when viewed from the other. The treatment is called a "molecular bombardment" with a special chrome alloy through thermal evaporation in a high vacuum. The reflecting surface is the one that is metal-coated.

Key to the transparent mirror's performance is the almost incredible thinness of the film of chromium alloy applied. It is four ten-millionths of an inch thick. While constituting an effective reflecting surface, it is so thin that clear photographs can be taken through it.

In making the mirrors the glass to be coated is placed around the insides of a vacuum chamber, and the chromium particles are suspended on a filament in the center. After powerful pumps have created a very high vacuum in the chamber, an electric current is passed through the filament. The current instantly evaporates the metal, molecules of which dash with the speed of light to the glass. They cling so tightly that they can not be removed by scrubbing.

Glass can be similarly coated with silver, gold, aluminum, lead and other metals. The transparent mirror is suitable for use in many applications where one-way observation only is desired.

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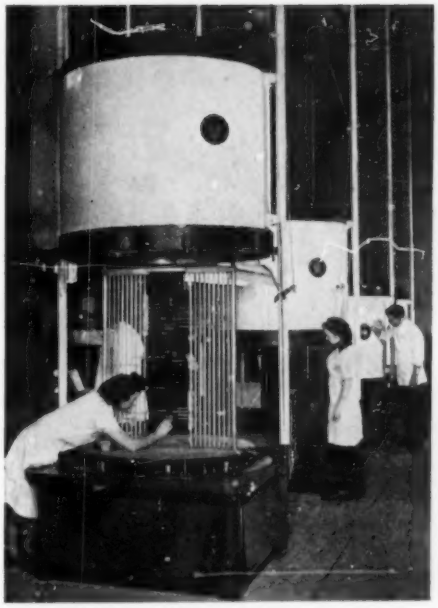

MIRROR-MAKING — Thermal evaporation chambers are used to surface glass in the laboratory of Libbey-Owens-Ford Glass Co. for use as mirrors and windows at the same time.

MEDICINE

Cancer Can Be Avoided

➤ ALTHOUGH the cancer problem is extremely complex and far from being solved yet, medical scientists have learned some of the conditions under which cancer may arise. Some of these can be avoided or corrected. To that extent, therefore, there are ways of preventing or avoiding cancer.

In the case of skin cancer doctors can give fairly positive advice. Persons past middle age, for example, and those who have an aging skin are warned to avoid sunburn. Those who have warts, moles and any sores that are slow healing are urged to consult a doctor to make sure the condition is not one which may develop into cancer.

"The removal of all precancerous lesions (sores) of the skin will save many a life from cancer," Dr. Frank E. Adair, of Cornell Medical College, declared at a meeting at the New York Academy of Medicine.

Workers in gas service stations and oil plants, he continued, have brought to cancer specialists a new group of skin cancers of the hand. This occupational disease is due to the fact that the workers neglect to scrub the tar, oil and gasoline from the backs of their hands. These irritating chemicals remaining on the hands frequently produce skin cancer.

To doctors, Dr. Adair gave a warning that X-rays and radium applied to human skin have far greater danger than is generally recognized.

Drinking plenty of water may help prevent cancer of the bladder. A common cause of this cancer is the presence of stones and precipitated urine crystals. These produce a chronic irritation of the bladder lining, much of which could be prevented by acquiring the simple habit of drinking large amounts of water.

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NUTRITION

Many Protein Sources Can Substitute for Meat

➤ WITH THE COST of meat so high, some of you may be wondering which meat substitutes come closer to giving the same food value as meat. Fish and poultry are the same as meat; and cheese, milk and eggs furnish the same quality of protein, though you may need to eat more of these than you realize to get the same amount that a quarter-pound portion of meat would furnish.

One-half cup of cottage cheese furnishes one-fourth of the day's ration for a moderatively active man as recommended by the National Research Council. One ounce of American cheddar cheese and one cup of pasteurized milk each furnish one-tenth of the day's requirement for the moderately active man.

From one-quarter of a pound of pork weighed as purchased, you get one-fifth the day's protein requirement for the moderately active man. Liver, beef, veal, lamb and poultry furnish one-quarter of the day's allowances per quarter pound each.

If you score the day's ration for the moderately active man at 100, six slices of bread furnish 18% of the protein allowance. Dry peas and beans each furnish 6% per ounce. Even potatoes help. One medium Irish or sweet potato furnishes 3%.

These figures are from a food value chart prepared by Grace Steininger and Evelyn Lorenzen and published by the New York State College of Home Economics at Cornell University. Besides giving information on protein values, this chart provides a simple way of scoring the nourishing value of the entire day's diet for each member of the family.

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PHYSICS-ASTRONOMY

Atomic Powered Rockets

Atomic energy may speed the earth's man-made moonlet so that it gets far enough out into space to offset the pull of gravity.

➤ ATOMIC POWER may solve the problem of getting a rocket far enough out into space to offset the pull of earth's gravity by the centrifugal force of its endless five-miles-a-second circling. This suggestion is offered in *Army Ordnance* (Nov.-Dec.), by E. M. Rogers, well-known writer on military and technical subjects.

Five miles a second is at present an impossible speed, Mr. Rogers admits, but he declares that in a relatively few years it will be attained. The rocket destined to be earth's man-made moonlet could not be sent up through the air at that speed, however, or it would melt itself by air friction like a meteor in reverse. Propulsion would have to be so designed as to send the missile up at a relatively low speed until it got beyond the earth's relatively thin envelope of air.

At 200 miles up, atmospheric friction ceases to be a practical problem. At that level, the rocket motors could be turned on full speed ahead until the five-miles-a-second velocity was reached. It would not matter, after that, how soon the fuel ran out. In the absence of friction, the rocket would keep on circling around the earth forever at the same speed.

A big rocket can be seen with telescopes at 200 miles, even without its fiery tail; it is also possible to track it with radar. Instruments in the circling satellite could send down continuous reports on cosmic and other radiations, magnetic storms from outer space, drifting particles of interplanetary debris, stray plant spores and other matters of scientific usefulness.

If it should ever become possible to put a human crew on such a satellite, their lives would be rugged ones. Cramped for space and breathing rationed oxygen, they would have to protect themselves by night against the absolute zero of cold (459 degrees below zero Fahrenheit), and by day fend off the blazing heat of the sun, besides unquenched ultraviolet radiation, possibly unknown types of cosmic rays, and the ever-present risk of a direct hit by a hurtling meteorite. A berth on a lightship, or a job in an Antarctic weather observatory, would be downright Persian luxury compared with the task of a "satellite sitter."

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CHEMISTRY

Carbon 14 Research Starts

Radioactive carbon can be traced in living tissue, giving valuable information about body chemistry. Nation-wide distribution of this tool has begun.

➤ BASIC RESEARCH which may some day lead to an understanding of the fundamentals of life itself have started with radioactive carbon isotope 14 at the University of California.

Four shipments of the precious research tool produced in the atomic piles of the Monsanto-operated Clinton Laboratory of the Manhattan Engineer District at Oak Ridge, Tenn., were received there, the first to arrive under a nation-wide distribution plan.

Laboratory work in many fields was started immediately. Described as the most promising tool for unfolding the elementary processes of living things, radioactive carbon can be traced in tissues and chemical substances by means of its radiations.

With researchers all over the nation receiving the substance in relative quantity from the atomic pile, biological scientists await with keen anticipation the first results of work with radioactive carbon.

Dr. D. M. Greenberg, professor of biochemistry, will use the radioactive carbon he received to study heretofore hidden mechanisms involved in the synthesis and breakdown of proteins, the basic building blocks of living tissue. Dr. Greenberg will try to determine how both normal and abnormal cells grow, striking at the heart of the cancer problem.

Dr. A. P. Krueger, professor of biochemistry, will use the millicurie of radioactive carbon he received in his study of the airborne transmission of respiratory diseases.

Dr. I. Chaikoff, professor of physiology, will investigate what happens to the fat molecule in the body, by labeling it with radioactive carbon. The fat molecule is intimately tied in with basic problems of metabolism.

Dr. William Dauben, instructor in chemistry, will use his shipment of radioactive carbon to study the metabolism in the body of anti-malarial pharmaceuticals developed during the war.

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NUCLEAR PHYSICS

Rare Radioactive Gas Generated from Atom Bomb

➤ A NEW and rare radioactive gas was generated by the second atomic bomb at Bikini and was detected in the atmosphere over Oklahoma three days later.

This is the conclusion presented in a report to the *Physical Review*, journal of the American Physical Society, by a group of five Tulsa scientists, R. E. Fearson, A. Wendell Engle, Jean Thayer, Gilbert Swift and Irving Johnson.

Radioactive concentrates were prepared from the atmosphere and radioactive decay constants were determined. The scientists concluded that the deposit obtained July 28 consisted of element 86 with a half life of 82 minutes. Element 86 is radon, a radioactive gas which is known as the first disintegration product of radium. The kind of radon found by the Tulsa scientists would be a different variety or isotope from the one obtained from radium and may be in an unreported radioactive series.

There has been apprehension that atomic bomb fission products would float around the world, polluting the air. Scientists in many places set up experiments to detect atmospheric effects, but negative results were obtained in most places. A marked increase in gamma rays was reported from Houston, Texas, on July 4 and linked with the first explosion at Bikini July 1.

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ENGINEERING

Four Motors to Pump Water from Grand Coulee

➤ FOUR MIGHTY motors to pump irrigation water from the Grand Coulee reservoir have been ordered. They will be the most powerful single alternating current electric motors ever built.

These giants will be 65,000 horsepower units, 50% larger than the most powerful motor of the type now in existence. Each will force more than 600,000 gallons of water a minute through an 850-foot tunnel into a canal leading to a reservoir from which the water will flow to irrigate more than a million acres of semi-dry land in south-central Washington.

The giant motors are to be built by Westinghouse at its East Pittsburgh plant. At the Grand Coulee project, they will team up with six huge water-wheel generators designed and constructed by the same company. Each motor will weigh 325 tons, and will be as big as a modern six-room house. Their rotors, or rotating parts, will each weigh 172 tons.

The heating in such giant motors constitutes a special problem. In operation the motor will revolve 200 times a minute, using up 50,000 kilowatts of electricity. This means the generation of very large amounts of heat. Because these motors will be completely enclosed, cooling will be accomplished by recirculated air, which itself will be cooled by water.

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TEXTILES

Less Frills, Better Fabric Will Please Housewives

➤ ATTENTION, clothing designers: the American woman wants her house dresses to be more practical, not with more frills.

Colorfast with less shrinking and more easily understood labels are what she wants in her house dresses, the American Home Economics Association's Consumer Speaks poll found when it quizzed 11,577 women recently.

Votes of 750 groups of women in 22 states revealed that the quality of fabric and workmanship were two-to-one over design details in the choice of the women. Instead of frail trimming, the women want better material in their dresses, the poll showed.

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GRAND COULEE—This dam is being made ready to irrigate more than 1,000,000 acres of semi-arid land in south central Washington. The Westinghouse Electric Corporation is building four 65,000 horsepower motors to pump water.

MEDICINE

Pentaquine Cures Malaria

➤ A CHEMICAL that cures malaria instead of just suppressing it is reported to the medical profession through the columns of the *Journal of the American Medical Association* (Oct. 12).

The chemical has been named pentaquine. During the secret wartime search for drugs to protect our fighting men against malaria after the quinine of the Dutch East Indies was lost, pentaquine was known as SN 13,276.

"Radical cure" of severe vivax malaria is achieved by pentaquine when given with quinine every four hours day and night for 14 days, Dr. R. F. Loeb, chairman of the Board for Coordination of Malarial Studies, states in the report to doctors.

In 16 out of 17 patients, the drug given in this way completely eradicated the disease. When given without quinine, pentaquine is only partially effective in preventing relapses.

The effectiveness of pentaquine was less striking when given to volunteers who got malaria in experiments planned to duplicate conditions under which persons would get the disease naturally.

Although the drug is considered safe to give for treatment, Dr. Loeb's report cautions that it should be given only under close medical supervision and preferably in a hospital. It is too poisonous to be used for prevention or prolonged suppression of malaria.

Studies are now being made to learn whether it can safely be given to dark-skinned races or whether, like another anti-malarial drug called pamaquine, it will cause a severe anemia.

Pamaquine, also called plasmochin, was developed in 1930 and was effective in treating vivax malaria, but the dose for a cure was too close in size to the poisonous dose. Pentaquine in curative doses is about one-half to three-fourths as poisonous as pamaquine.

Vivax malaria is the most common kind in the United States and caused the most trouble among our forces in the South Pacific. Atabrine and quinacrine or SN 7618, another of the war-developed anti-malarials, do not cure vivax although they stop each attack of chills and fever and are good suppressives. They do cure a less common but more often fatal kind of malaria, falciparum.

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INVENTION

Cooling Liquid Gives Milk Cans Showerbath

➤ IN A REFRIGERATING showerbath for milk cans and similar containers, the cooling liquid is recirculated through a mechanical chilling unit, and kept constantly drizzling over the cans as they stand in a closed cabinet. This invention of A. F. McMahon of Oak Park, Ill., is covered by patent 2,411,833.

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MEDICINE

Cancer Death Rate Shows Downward Trend

➤ THE WAR against cancer is being won on some fronts.

This good news was brought by Evelyn A. Potter, biometrician of the Massachusetts Department of Public Health, to the cancer symposium at the meeting of the American Public Health Association.

Deaths from cancers of the stomach, uterus, mouth, skin, liver and breast have shown a downward trend during the past 10 years. Marked upward trends in deaths from cancers of the lung, pharynx and bronchus have occurred during the same period.

Efforts to control cancer by teaching the life-saving importance of early diagnosis and treatment have played a part in turning the death rate down for some kinds of cancers. In Massachusetts, first state to develop an integrated cancer program, the downward trend in cancer deaths among women began in 1933, six years before a similar drop for continental United States.

The later drop in the female cancer death rate for the whole nation reflects the increased cancer control activity that occurred as the result of the inauguration of the cancer program of the U. S. Public Health Service, that of several states, and the educational activities of the American Cancer Society.

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ENGINEERING

Sturdy Sectional Trucks Can Be Carried by Plane

➤ FULL-SIZED, full-powered trucks that can be unbolted into sections and carried by plane to jobs far beyond any road-end or railhead are the newest contribution to air-minded industry and engineering. Their design, developed by R. D. Bagley of Indiana, Pa., and J. E. Berman of Suffolk, Va., is covered by U. S. patent 2,409,181.

During the recent war, the biggest motor vehicle that could be made airborne was a jeep or a very light truck. But the new truck is a solid, sturdy, six-by-six job, with tandem dual rear wheels and power applied to all three axles.

It comes apart into three sections. The first, consisting of the cab, engine and front wheels, can climb a ramp into a cargo plane under its own power, with some help in keeping balanced. The body can be unbolted into two sections, each with its pair of dual wheels. For medium-sized cargo planes each section would constitute a fair load.

Bolts for holding the sections together are strongly designed, and arranged for quick manipulation.

While the inventors had military uses primarily in mind when they applied for their patent, it is obvious that a truck of this kind should be able to pay its way in lumbering, mining or construction camps all the way from far northern tundras to tropical jungle plateaus.

Science News Letter, December 7, 1946

DENTISTRY

Glands Play Part In Tooth Eruption

➤ A PARTIAL SOLUTION to one of the fundamental mysteries of physiology, the eruption of teeth through the gums, has been provided by the University of California Medical School scientists.

The researchers found in experiments with rats that the growth and thyroid hormones are factors in this eruption.

In their experiments the scientists removed the pituitary glands from young rats, halting eruption of teeth. Enamel and dentine continued to build up, folding under the gums and causing a distortion of the root ends which is sometimes seen in man. Enamel formation eventually stopped entirely.

Surviving rats were injected with thyroxin and the growth hormone after a year without their pituitaries. Even though the animals were old and mature, the hormones started vigorous eruption once again.

The research was done by Dr. Herman Becks, professor of dental medicine; Dr. Daniel A. Collins, research assistant; Dr. Miriam E. Simpson, professor of anatomy; and Prof. Herbert M. Evans, director of the Institute of Experimental Biology.

Science News Letter, December 7, 1946

ZYMOLOGY

Brewer's Yeast Grown With More Vitamins

➤ INCREASE by at least 50% in the vitamin contents of brewer's yeast by keeping it on a limited food supply and at relatively low temperature for a week or more is claimed by Ben Maizel of Chicago in patent 2,411,445, which he assigned to the Vico Products Company.

Science News Letter, December 7, 1946

IN SCIEN

HORTICULTURE

Ladies May Receive Orchids to Eat in Future

➤ ORCHIDS that you can eat are a possibility of future American gardens. These strange plants are among the 11,000 specimens of flowering plants and ferns brought back to the New York Botanical Garden by an expedition into mountainous Nyasaland, in the most inaccessible part of East Africa, under the leadership of Arthur S. Vernay.

These orchids, unlike the highly ornamental species that perch on the limbs of trees, grow in the ground like ordinary plants. The natives dig up their tubers, cook them elaborately, and eat them with cornmeal. They will be grown in the Botanical Garden's greenhouses along with 60 other kinds of orchids.

Science News Letter, December 7, 1946

PUBLIC HEALTH

UNESCO Proposes Center For Community Planning

➤ AN INTERNATIONAL center for home and community planning will be considered by the United Nations Educational, Scientific and Cultural Organization.

Proposed to provide a rallying point for the many experiments in town and country planning and in the building and making of homes, the center would emphasize means of stimulating the latent creative talents of people otherwise liable to lead stunted lives. The center would include a library, a small repertory theater, a lecture and concert hall, a local museum and a place for amateur painters to exhibit their work.

In building the center, UNESCO would work in collaboration with other United Nations groups, including the Food and Agriculture Organization, the International Labor Organization, the section of creative arts.

The center is proposed to provide a defense for the home and community against the tendency toward industrialism and urbanization, particularly in countries where industrialization on a large scale is only now being introduced.

Science News Letter, December 7, 1946

NCE FIELDS

CHEMISTRY

Copper, Rubber Become Friends with New Process

➤ A WAR-BORN invention, designed to meet a Government demand for copper wire coated with natural rubber that would not deteriorate quickly, won for D. J. Miller of Akron patent 2,411,284, rights in which he has assigned to American Anode, Inc.

Though often found together, copper and rubber are really not good friends. The copper rots the rubber, and sulfur in the rubber attacks the copper. So in the past the wire has been pre-tinned, paper-wrapped, or otherwise treated to separate it from the rubber.

In Mr. Miller's invention, the wire is first coated with a powder consisting of zinc nitrate, calcium nitrate and a wetting agent. Then it is run into a latex bath and the rubber deposited directly on the wire. After vulcanization, the rubber surface is treated with chlorine to give a smooth, non-sticky finish.

Science News Letter, December 7, 1946

ASTRONOMY

Expedition to Study Total Eclipse of Sun

➤ AN EXPEDITION of American scientists will observe the next total eclipse of the sun from a site about 400 miles north of Rio de Janeiro. An open field on a cattle ranch near the town of Bocayuva has been selected as headquarters for those going under the auspices of the National Geographic Society and the Army Air Force.

On May 20, 1947, the sun will be hidden behind the moon for fortunate observers along the path of totality which crosses South America, the Atlantic Ocean and Africa. Partial phases of the eclipse will be visible over all of South America except parts of Ecuador, Colombia and Venezuela. People at sea, on the Atlantic Ocean between South America and Africa, may also see the sun partially hidden. Partial phases will also be visible from all of Africa except the northern tip of Tunisia, the Red Sea, the southern and western part of Arabia, and the western half of Madagascar.

Bocayuva, situated on a plateau almost a half mile above sea level and close to the center of the zone of totality, was chosen as grandstand for the celestial show after AAF observers made aerial photographs and studied weather conditions over a large area along the path of the eclipse. They will live in a tent community. Meteorological information supplied by Brazilian authorities indicates a better than even chance for clear skies during May.

Simultaneous observations of the total eclipse of the sun, made from Brazil and the Gold Coast of Africa, are expected to add not only to our knowledge of the sun and moon, but to give us more exact information about the earth itself.

Expeditions will be sent to the two coasts under the auspices of the Geodetic Survey of Sweden, states Dr. Bertil Lindblad, director of the Stockholm Observatory and now visiting at Harvard College Observatory. Observations made on the coasts of these two continents will be exactly timed and synchronized, he reports.

The first appearance of the flash spectrum, caused by light from the sun's outer envelope and visible only at the very beginning or end of a total eclipse, will be accurately clocked. More exact calculations than previously possible of the longitude of the two observation points will be made from these data.

The moon's parallax and polarization of the light of the sun's corona will be studied. The topography of the moon, as outlined against the sun's bright disk, will also be recorded.

Science News Letter, December 7, 1946

ENGINEERING

Inflatable Bags to Help Raise War-Sunken Ships

➤ AFTER EVERY modern war there are hundreds of sunken ships waiting to be raised and salvaged. One way of getting them to the surface has been to sink great steel cylinders called "camels" alongside, pass cables under the sunken vessel, and inflate the camels to make them float.

To obviate the cost and clumsiness of the camels, E. A. Brizay, an Austrialian inventor, proposes to have divers fill the interior of the sunken vessel with inflatable bags, strung on lines between decks, like a week's washing, and then pump air into them. This idea has won him patent 2,411,649.

Science News Letter, December 7, 1946

OPTICS

Device Takes Guesswork Out of Color-Matching

➤ COLOR-MATCHING, important in a thousand industries all the way from hosiery to house-paint, has the guesswork taken out of it by a device on which U. S. patent 2,411,741 has been granted to J. L. Michaelson of Schenectady, a General Electric Company engineer. With it you do not attempt to match the colors directly, but fit two curves that are the electrical expressions of the color standard and the sample.

A beam of light is turned on standard and sample in rapid alternation, by means of a moving mirror. Light reflected from the two surfaces is caught by a train of mirrors and passed through an analyzing prism into a photocell. Current from the photocell, suitably amplified, is passed into a cathode-ray tube, tracing the curves on its viewing surface for comparison.

Science News Letter, December 7, 1946

ASTRONOMY

Harvard Observatory To Celebrate Centennial

➤ HARVARD College Observatory, well known as the clearing house for astronomical information in the Western Hemisphere, will celebrate its hundredth birthday in December.

To mark the centennial, the observatory will play host Dec. 27 through Dec. 30 to hundreds of astronomers who will be in Boston for the annual conventions of the American Astronomical Society and the American Association for the Advancement of Science.

Completed in 1846, the observatory was the first planetarium in the world to photograph the stellar activities of the sky. Since 1880 large regions of the sky have been systematically photographed each night at the observatory. The more than 500,000 photographic plates enable astronomers to check stellar activities during any clear night of the past 66 years.

Throughout the past quarter-decade the observatory has been under the directorship of Dr. Harlow Shapley. Growth of the observatory and increased demands upon the staff recently resulted in the appointment of Dr. Bart J. Bok as the observatory's associate director under Dr. Shapley, and Dr. Donald H. Menzel as director for solar research.

Science News Letter, December 7, 1946

AVIATION

Oil, Fuel of Aviation

Although oil is not the only essential, nations having this raw material are a step ahead in aviation. In air service there is no real substitute for petroleum products.

By A. C. MONAHAN

See Front Cover

➤ NATIONS with oil are a step ahead in the aviation game. Planes must have fuel to fly. The principal fuel now and for some time to come is taken from natural petroleum.

This does not mean that gasoline made from coal, oil-shale and natural gas is unimportant. It will undoubtedly play an increasingly important role as natural oil supplies become harder to get. Atomic energy some day may replace power from fuel, but not in the immediate future. Oil is a number one essential.

It takes more than oil, of course, to put a nation in aviation's front ranks. Brains must be available to design, construct and fly planes. Then, many raw materials are needed for construction. A country without a domestic supply of these has a severe handicap, particularly in wartime.

The United States has all the essentials to put it in the lead in aviation except certain minor metals for necessary steel alloys. The situation in Russia is similar. England and Western Europe have the brains and facilities for developing planes and for flying them, but have little domestic oil. They lack many of the raw materials needed for construction.

Lack of Materials

Except for America and Russia, few of the nations that have the ability to nations that have the oil lack the materials required to build or fly them. The nations that have the oil lack the materials and facilities for constructing planes.

An aviation gasoline re-cycling unit at the Standard Oil Company's Baytown refinery is pictured on the cover of this SCIENCE NEWS LETTER. Horton Spheroid storage tanks are shown in the background.

Petroleum products have many uses other than in aviation, of course, but for many of them substitutes can be used. Air service, however, now depends largely on motor fuels derived from crude oil. All conventional aircraft engines operate on a gasoline fuel. Jet-propulsion planes use gasoline or kerosene. Rockets use other chemical fuels, but rocket power now has limited applications only.

Among the oil-producing nations, the United States ranks first. This does not mean that we have the largest oil deposits. It merely means that we have developed uses for oil, and met the demand by draining our reserves. We are now frantically searching for more.

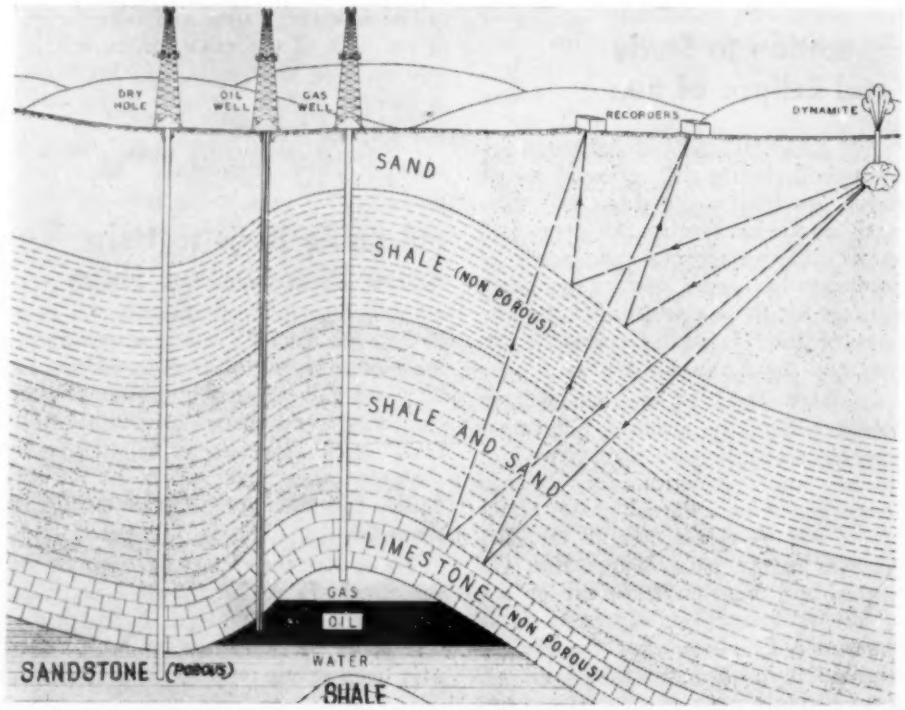
Our explorations have extended outside the continental United States. Drilling is underway in the Point Barrow area in northern Alaska. The continental shelf in the Bahama seas is being studied under water by scientists working in diving bells. A test well is reported being drilled off America's east coast. Vast underwater areas are being explored with airborne magnetometers, the "doodlebug" that during the war located enemy submerged U-boats.

Up-to-date reliable figures on world production of oil are not available for comparative studies. Figures for 1940, however, show normal prewar production. During that year, the United States produced approximately 63% of the total world supply of crude oil. We exported much, but we used more here at home in our planes, our millions of automobiles, and in our power and heating plants.

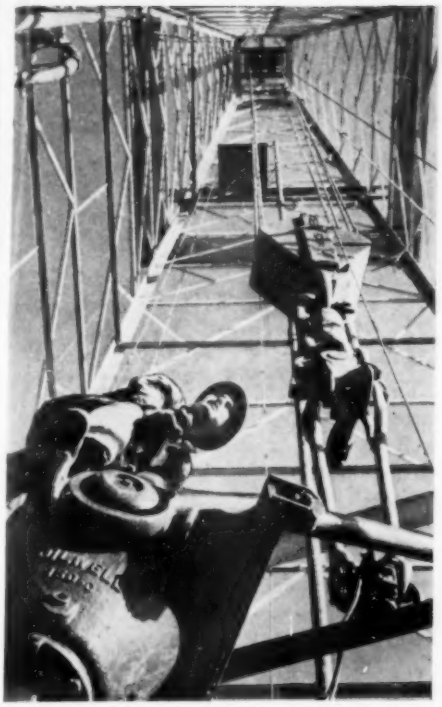
U. S. Leads Production

Nearly 1,352,000,000 barrels were produced in the United States. The Soviet Union was second with 213,000,000 barrels. Venezuela came next with 185,000,000 barrels. Then came the Arabian sea region, which many believe to be the richest field in the world, with 110,000,000 barrels mined in Iraq, Iran and Arabia.

The Netherlands East Indies followed in line with 61,000,000 barrels, and then Romania with some 43,000,000 barrels, only two-thirds of its production before the European war started. The amount



TRAPPED OIL—Typical manner in which oil is trapped in a rock and one way of identifying the rock formations are shown in this diagram.



LOOKING UP—The worker is looking up the inside of an oil well derrick. Pictures and diagram by courtesy of the Standard Oil Co. (N. J.)

of oil produced in other countries in Europe is of minor importance.

Japan has only a small quantity of domestic petroleum. That is one reason why the Nips grabbed Borneo, Java, Sumatra and Burma, and also potential oil country in the Philippines and New Guinea. The amount of petroleum in the Netherlands East Indies is unknown, but is believed by many to be large. Tropical conditions make development difficult, but these will be overcome soon. Australia, which mines no oil, is a growing nearby market.

In the world-wide search for oil deposits, geologists now have reached a point where they are able to plot roughly the regions that are favorable for the occurrence of petroleum. They know the underlying strata well enough to identify the types favorable to oil formation. Instruments such as gravity meters, magnetometers and seismographs help them in their explorations.

Geologists believe that the thick series of sediments which accumulated on the floors of former "land-locked" seas are the most likely places for the generation of the valuable fluid. Land that was permanent during the geological ages, and deep ocean bottoms, are not regarded as likely areas. Continental shelves, the relatively shallow ocean bed extending offshore for many miles on a number of coasts, are regarded as good hunting grounds. Most of them are sediment deposits and were once high and dry.

Geologists call regions with underlying formations favorable for petroleum "petroliferous." The United States has only one-eighth of the world's petroliferous area. Russia probably has nearly five times as much.

Soviet petroliferous areas include the producing regions of the Black and Caspian seas, and areas extending to the north from the Caspian two-thirds of the way to the Arctic ocean. They include also great tracks in Siberia and along the fringe of the Arctic ocean.

Northwest Area

In North America, a petroliferous area, much of which is undeveloped, extends northwest from the Texas panhandle. Passing just east of Denver, it includes the Wyoming and Montana fields. Extending onward into Canada surrounding Calgary, Alberta, it reaches about the northern boundary of this province. After a break, it goes on to the Arctic, nearly adjoining the Navy petroleum reserve area in the Point Barrow region of north Alaska.

A petroliferous region extends westward from the present Ohio and West Virginia fields to the Mississippi and covers lower Michigan. Less promising geological formation exists in southwest Alaska, Florida, the southern coastal area of Hudson Bay, and far to the north of the continent itself to cover Victoria and many other little-known islands in the Arctic.

Andes Superior Area

In South America, an undeveloped petroliferous region, called by geologists a superior area, stretches along the east slopes of the Andes perhaps 1,500 miles, from Colombia through western Brazil to Argentina.

Paraguay, Uruguay, southern Brazil and all Argentina lie in an inferior petroliferous area.

The hopes for oil in Africa are not so promising. The most likely area is a relatively small Mediterranean section in Egypt. There's a possibility of petroleum on the Indian ocean coastal area, and on Madagascar.

For Australia, a domestic supply of natural oil is not very hopeful. The most promising area is a region just south of the Gulf of Carpentaria, extending southward near the western border of Queensland.

While Russia has large potential oil reserves, many of these deposits can not be developed in the immediate future because they lie north of the Arctic Circle, far from existing railroads. Oil pro-

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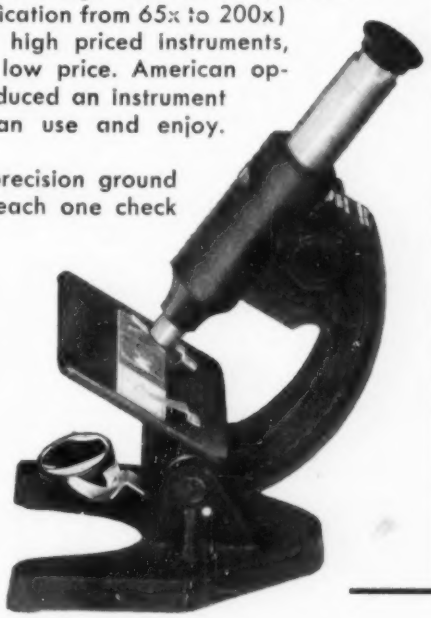

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duction on Kamchatka peninsula or on Sakhalin island would be significant, since petroleum from these locations could be shipped by tankers to refineries near eastern terminals of the Trans-Siberian railway.

There is an odor of oil in the present world political situation, and behind happenings of the past decade. Gasoline-short Japan's covetous eyes for years were focussed on the petroleum derricks of the Netherlands East Indies and on Burma. Hitler's hopes were first for the Romanian oil, then for the vast deposits in the Russian Caspian sea area.

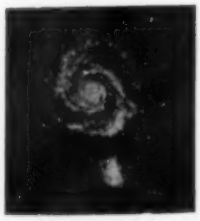
England's hopes are for an abundant supply of oil from Iraq and Iran. English interests developed and operate in these fields, and maintain nearly a thousand miles of pipeline to get petroleum across Iraq, Trans-Jordan and Palestine to ports on the eastern Mediterranean for shipment by tankers to the British Isles. This oil is an important factor in England's interest in Asia Minor.

America is also interested in this great potential oil-producing area which some day may be the most productive in the world. American oil companies hold concessions covering most of Saudi Arabia. During the war there was agitation for the United States government to build a 1,500-mile pipeline to the Mediterranean from the producing portion of Arabia near the Gulf of Persia.

While Russia has plenty of oil possibilities both in Europe and Asia, control of Iraq and Iran would give her a priority position in Eastern Hemisphere political affairs. Stoppage of the supply of Asiatic oil would leave all Western Europe dependent largely on the United States and Latin America for the fuel vital to aviation and transportation.

Science News Letter, December 7, 1946

ASTRONOMICAL PHOTOGRAPHS



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Do You Know?

An *insecticide* kills insects while a repellent keeps them away without necessarily killing them.

Pyrethrum, in spite of the new insecticides developed in the past few years, will continue to be used because of its effectiveness and safety.

The enterprising Soviet Union is reported to have sent a group of experts to Kamchatka peninsula, in the north Pacific, to determine if the *hot springs* there can be put to work to heat greenhouses to grow vegetables.

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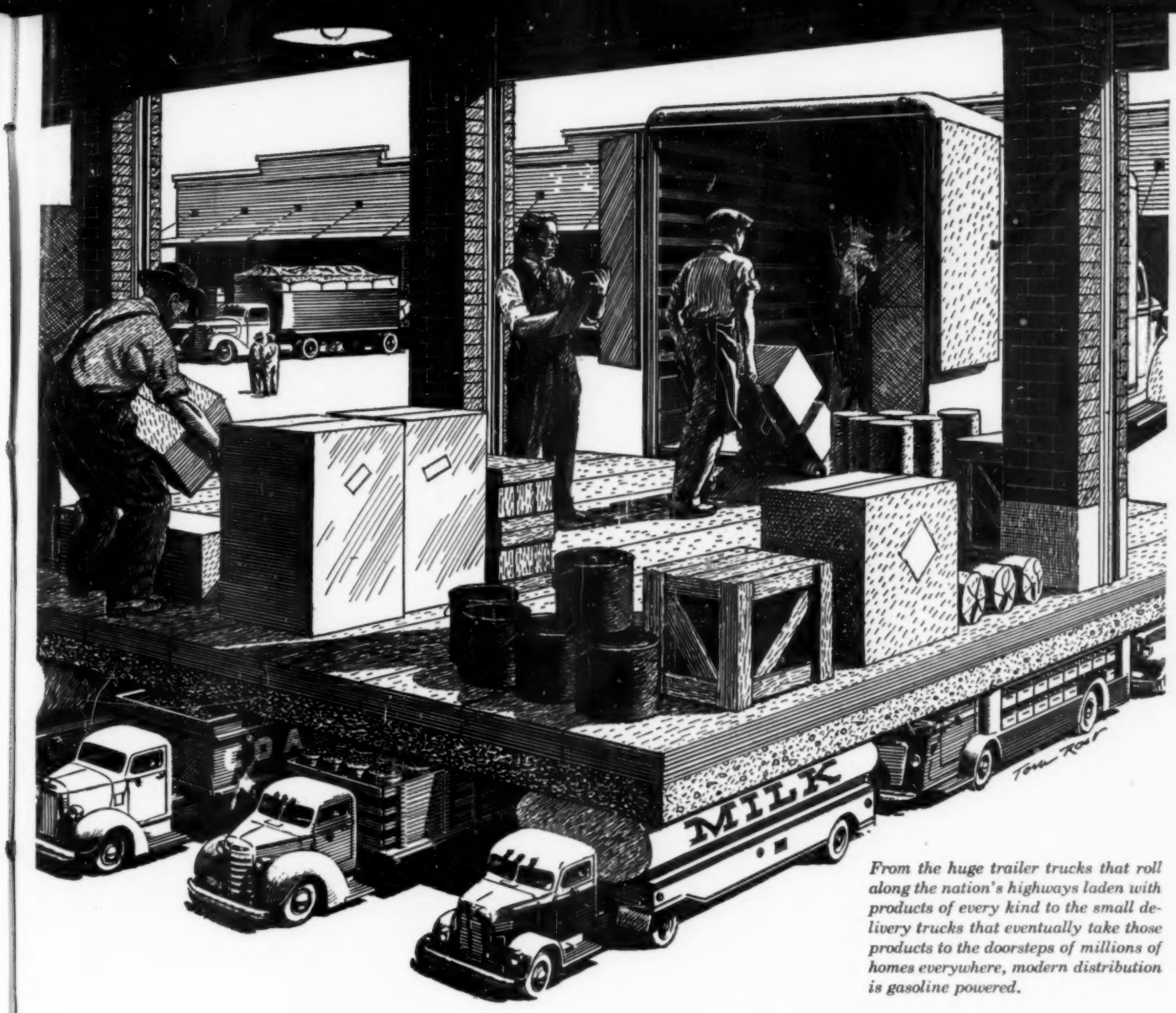

From the huge trailer trucks that roll along the nation's highways laden with products of every kind to the small delivery trucks that eventually take those products to the doorsteps of millions of homes everywhere, modern distribution is gasoline powered.

Distribution cost depends on gasoline

ONE WAY to make money is to manufacture a product and sell it in volume at a profit. But between the making and the selling comes the problem of *distributing* it economically to the nation's markets. To do this, America's business men are depending more each year on gasoline power. And the more they depend on trucks to deliver goods to wholesalers, retailers and homes, the more value they get from each reduction in the cost of gasoline transportation.

During the past twenty years this cost has been reduced substantially. Gasoline itself costs less per gallon than it did in 1926 *in spite* of increased taxes. And by producing increasingly *better* gasoline—through improved refining methods and the use of antiknock fluid made by Ethyl—refiners have made possible the development of more powerful engines that provide better, more economical transportation.

Nor have the limits of fuel and engine progress been reached by any means. As oil refiners will continue to improve gasoline, automotive engineers will design engines capable of converting its extra available power into greater payloads, faster schedules, lower delivery costs. It is toward this end that Ethyl research engineers, today as in years past, are working in close cooperation both with oil companies and with automotive companies. Ethyl Corporation, Chrysler Building, New York 17, New York.

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Books of the Week

ADVANCED MECHANICS OF MATERIALS—Glenn Murphy—*McGraw-Hill,* 307 p., answers to problems, figs., $4. An advanced undergraduate or graduate course in strength of materials, including such topics as the relationships among stresses and strains at a point, theories of failure, axial loading, stress concentration, and others, with emphasis on the tools, geometry and properties of materials.

THE ANCIENT MAYA—Sylvanus G. Morley—*Stanford Univ. Press,* 520 p., illus. $10.00. The authoritative story of America's most brilliant native civilization in pre-Columbian times in Northern Central America and Southern Mexico.

A.S.T.M. STANDARDS ON TEXTILE MATERIALS (with Related Information) 1946 issue—*American Society for Testing Materials,* 490 p., illus., paper, $4. Contains definitions and terms, methods of testing, tolerances and specifications for textiles and related materials developed by the A.S.T.M.

BUTALASTIC POLYMERS, Their Preparation and Application—Frederick Marchionna—*Reinhold,* 642 p., illus., $8.50. A treatise on synthetic rubbers, giving sources and production of monomers, mechanism and processes of polymerization, and processing and industrial application of butalastics.

FROM GALILEO TO THE NUCLEAR AGE—Harvey Brace Lemon—*Univ. of Chicago Press,* 451 p., illus., $5. This revised edition of *From Galileo to Cosmic Rays,* presents physics in a highly entertaining though authoritative manner, and makes the subject fascinating to students and nonscientific readers.

GREENHOUSE GARDENING FOR EVERYONE—Ernest Chabot—*Barrows,* 266 p., illus., $3. A book that answers about all the questions about gardening under glass, and carries a chapter on insects and plant diseases, with a program for easy control, as well as calendars and tables for planting in greenhouses and garden frames.

MICROCALORIMETRY — W. Swietoslawski—*Reinhold,* 199 p., figs., $4.75. This book gives a comprehensive description of the methods used in measuring small amounts of heat developed by different objects. Microcalorimetric measurements have been employed in many fields recently, and it is expected that a wider application of this method lies ahead.

NEW WORLD OF MACHINES: Research, Discovery, Invention—Harland Manchester—*Random House,* 313 p., illus., $3. The story of the new discoveries and inventions that will reshape the post-war world, such as radar, television, new wonders of lighting, communication and transportation, plastics, artificial rubber, and the new techniques in farming.

PERSONAL COUNSEL—A Supplement to Morals — Robert Frank — *Informative Books,* 306 p., $3.50. Although this book is an attempt to meet popular reading requirements in the presentation and explanation of fundamental principles and facts applicable in personal relations, it is suggested as a collateral text in the presentation of intimate personal problems confronting young people.

Science News Letter, December 7, 1946

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BOTANY

NATURE RAMBLINGS by Frank Thone

They Do Not Die

➤ DYING FLOWERS and falling leaves have been the keynotes of no end of melancholy mopings in song and verse. The general symbolism seems to go away back: we find it in such myths as those of Isis and Osiris, Venus and Adonis, and Orpheus and Eurydice. The slaying of Baldur with the mischievous Loki's arrow of mistletoe is a Northern variant of the same theme.

In modern times, poets with a relish for the melancholy have for the most part dropped mythological symbolism and written directly about the dying flowers themselves. Probably Bryant's poem, beginning "The melancholy days have come," is the best known of this genre.

Bryant even selected a few species for special mention: windflower, violet, brier-rose, orchis, goldenrod, aster and brookside sunflower. Bryant was a pretty good poet, but he certainly must have been either ignorant or unmindful of botany, for not one of the plants in his list dies in the fall. They are all perennials; though their flowers may dis-

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appear and their leaves wither and decay, the plants themselves are very much alive in underground root and rhizome. Even while we are reciting elegies over their supposed graves, the flowers are preparing, in hidden beginnings of leaf and bud, for next season's growth and blossoming.

As a matter of fact, we all know this, and in the spring we make use of our knowledge when we celebrate the resurrection-feast of Easter. Not only to the Christian religion but to most pagan ones as well, flowers have always been foremost symbols of belief in immortality, because so many of them actually are physically immortal. Our perennial talk about their dying in autumn is just another instance of the extraordinary capacity of the human mind to entertain two mutually contradictory ideas at the same time.

Even the overground plant parts that do wither and decay are not lost to the cycle of life. Fed upon by the complex hordes of lower organisms in the soil, they presently become part of the soil itself, enriching it and enabling it to sustain coming generations of plant life.

Science News Letter, December 7, 1946

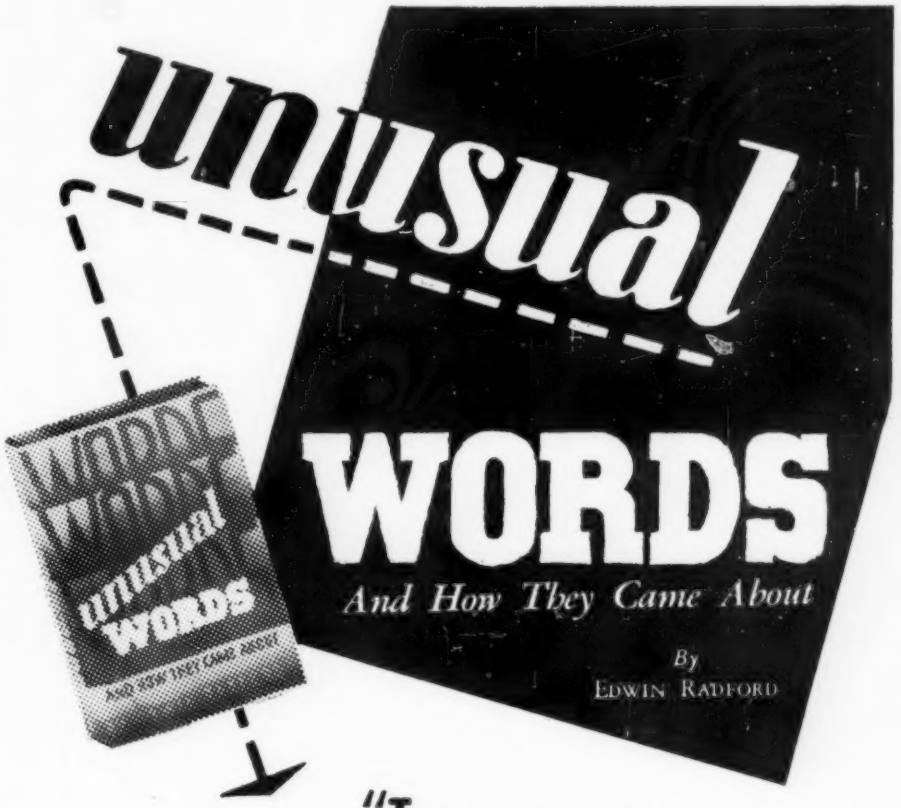
CHEMISTRY

New Chemical Kills Nematodes, Soil Pests

➤ A NEW CHEMICAL for killing nematodes, which are plant-destroying lower worms that infest many soils, is known as 1,1-dichloropropene-2. On this, patent 2,411,566 has been granted to Dr. T. W. Evans of Oakland, Calif., a Shell Development Company chemist.

Science News Letter, December 7, 1946

Diplomas in Roman days were not school awards but letters of recommendation given to travelers visiting the provinces; the letters were folded double, hence the name.



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• New Machines and Gadgets •

❁ *ELECTRIC HEATER for homes is a portable unit that in appearance resembles the ordinary steam radiator, but uses no water or steam. It heats the air drawn through it by convection. A handle bar across the top can be swung in front of the radiator and used for drying lingerie.*

Science News Letter, December 7, 1946

❁ *HAY BALER, drawn and operated by a tractor, mechanically picks up the hay in a windrow, packs it, ties it, and delivers the finished bales over a runway to a truck trailer attached behind. Only two men are required with this labor-saving farm machine; one operates the tractor, the other piles the bales on the trailer.*

Science News Letter, December 7, 1946

❁ *FOOTBALL helmet, made of plastic, combines lightness in weight with extreme toughness. This shock-absorbing protector consists of layers of canvas impregnated with phenolic resins.*

Science News Letter, December 7, 1946

❁ *TIRE for farm tractor outpulls, outcleans and outlasts any other tractor tire heretofore produced, it is claimed. The ground grip of the tire embodies curved, triple-braced high-traction bars that provide unequal pressure, causing the tire to shed mud automatically as it rolls.*

Science News Letter, December 7, 1946

❁ *MIDGET rectifier can replace a score of different rectifier-type tubes now used*

in radio receivers. This selenium rectifier, of the metal plate type, can be used to charge a two-volt battery in a battery portable set, and also deformed electrolytic condensers.

Science News Letter, December 7, 1946

❁ *AUTOMOBILE snowshoe provides traction for cars and trucks stuck in snow, mud or icy spots. It is a short, foot-wide track made up of cross-pieces separated by pads and joined by cables. In use, a specially shaped end is stuck under the spinning wheel.*

Science News Letter, December 7, 1946

❁ *RADIOACTIVITY probe is a portable battery-operated instrument, for general radioactivity surveys, with a meter and a four-foot cable for holding the Geiger-Mueller tube. The cable permits exploration in hard-to-get-at locations. A double-receiver headset is used for rapid surveying operations.*

Science News Letter, December 7, 1946

❁ *HARD-OF-HEARING attachment is a standard part of a new radio that can be used also as an ordinary set with its loudspeaker. By means of a plug-in cord attached to a magnetic earpiece, a deaf person can regulate reception to his needs without disturbing the volume for others.*

Science News Letter, December 7, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 340. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

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